Appendix 5.7-C

Terns and the Cape Wind Project in Nantucket Sound

APPENDIX 5.7-C
TERNS (*AVES: STERNINAE*) AND THE CAPE WIND PROJECT IN NANTUCKET SOUND

A report to Cape Wind Associates

And

ESS Group, Inc.

by

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EXECUTIVE SUMMARY

This report summarizes aspects of tern biology pertinent to the Cape Wind project and identifies the principal concern as the chance of mortality from collision with turbine rotors, especially for the endangered Roseate Tern. When migrating or foraging, terns are not known to fly at rotor height; when courting or commuting, terns may fly in that height range. The heights at which commuters fly is not known: data are needed. Recommendations are made for design-features of the wind farm. For a preliminary examination of tern use of Nantucket Sound, six aerial surveys were conducted during and after the breeding season, 2001. These observations showed Roseate Terns to be present in small numbers so that risks are very low. Most of these terns were foraging over the very shallow shoal areas west of Horseshoe Shoal, during the breeding season, but not after the breeding season. Very few were likely to traverse the area of the proposed turbine-field.

INTRODUCTION

In a recent assessment of potential risks to birds posed by the installation of wind turbines in Nantucket Sound (Kerlinger and Hatch 2001), two groups of seabirds were identified as of particular concern: terns and seaducks. The seaducks will be the subject of later reports, the present document addresses risks to terns and has two parts: first, a review of tern biology to identify important features based on personal knowledge and literature survey, and then a summary of preliminary information about the distribution and numbers of terns present, based on recent exploratory flights over Nantucket Sound. The report was originally prepared before the DEIS and the Biological Assessment and recent changes (Sep 2003) have been included to clarify the text rather than to make the report conform in detail to the other Appendices.

TERN BIOLOGY

Significant numbers of terns nest, roost, and feed around Cape Cod and the Islands. The Roseate Tern (Sterna dougallii), a Federally listed species (Endangered), and the Common Tern (S. hirundo) a state-listed species, are the principal birds. All are summer-visitors, present in the area May-September, and nest in mixed colonies. The major colonies in the area are in Buzzards Bay (both species) and on Monomoy (mostly Common Terns), which together comprise about 2000 pairs of Roseate Terns and 11000 pairs of Common Terns (Blodget 2000).

The terns arrive late April - mid May and for the first few weeks feed around the outer islands (Nantucket to Muskeget) before settling at the nesting colonies May-July. From these colonies they travel far to feed and carry food back to their mates or young. After nesting, the terns (and their young) disperse from the breeding colonies and many (perhaps all) congregate each night at a large roost on South Beach, Chatham which serves as a pre-migratory staging-area for terns from throughout New England from mid July-September.

Most terns in Massachusetts forage over shallow waters within about 6 miles (10 km) of the nesting colony but some will travel far to predictable sources of food. Boat surveys (in 1990 and 1991) showed that some Roseate Terns nesting on Bird Island foraged over shoals in Vineyard Sound and the western end of Nantucket Sound (Heinemann 1992). These shoals are as far as 16 miles (25 km) from Bird Island direct (overland), and about 22 miles (35 km) via Woods Hole. Some terns, at least, make triangular flights of at least 60 km: out by way of Woods Hole, returning direct, and some may fly both ways direct overland. Foraging movements after the nesting season have not been studied.

POTENTIAL RISK

Terns are unlikely to be adversely affected by habitat changes or disturbance resulting from the proposed project (Kerlinger and Hatch 2001), so the principal issue is mortality from collisions with rotor blades. Thus, the questions to be addressed are: (1) What brings terns to the project area? (2)When do they fly at the height of the rotors (~30-130 meters above sea level), and (3) How many are at risk? As will be shown below, the terns at risk **cannot** be simply judged from the number seen in the project area.

Terns may enter the project area while migrating, while traveling between areas used for other activities, including daily and seasonal movements (hereafter called commuting), and while foraging. While in the area they may engage in other behavior that brings them to rotor height (notably courtship).

When do they fly at rotor height?

Migrants may fly very high, well above rotor height (see Kerlinger and Hatch 2001 for evidence), but detailed information is lacking. Terns on migration are unlikely to approach the project area: local birds probably fly between the outer Cape and Islands and South America, and birds from further North are likely to travel further offshore.

Foragers might be particularly at risk of collision if they flew at rotor height because their attention is on their prey below, rather than on the air space ahead. However, most foragers fly below about 49 feet (15 m) (based on extensive personal observations and the recent summary of the literature by Gochfeld et al. 2001, although comprehensive quantitative data on foraging heights are lacking), thus are well below rotor height.

Courtship activities are most frequent at nesting colonies but also occur at pre-breeding staging areas. They include stylized high-flights in which 2 birds climb to 328 feet (100 m) or more. It is **recommended** that project designs exclude any flat or gently sloping areas suitable for groups of resting terns from which potential pairs are likely to start courtship flights that would bring them into the rotor zone.

Commuters are the principal unknown, and may include the greatest numbers at risk. They fly low into headwinds but higher with following winds. Terns flying to the roost on South Beach at dusk are at rotor height, at least over the beach. Heights offshore (in the project area) are not known.

RECOMMENDATIONS

It is recommended that data be gathered on the heights at which terns fly at/near Horseshoe Shoal. Also, to minimize the numbers of courting terns, it is recommended that design of the windfarm eliminate all potential resting places for birds, especially flat areas near sea-level.

Aerial Surveys of Horseshoe Shoal and Nearby Areas

The goal of the aerial surveys was to establish the numbers of terns present in the project area, or likely to commute through it (thus present in areas beyond it) during the two periods of chick feeding (June-mid July) and of pre-migratory staging (August - mid September). During these two periods the endangered Roseate Tern is principally located, respectively, in northern Buzzards Bay (colonies on Bird Island, Marion and Ram Island, Mattapoisett), and at a roost on South Beach, Chatham. The 2 separate periods were selected to make interpretation of results more straightforward. In this context, the term “large” can be interpreted as >5% of the population.

For these exploratory surveys the approach selected was to visit oceanographic features known to be preferred by foraging terns (i.e. shoals), both within and around Horseshoe Shoal (the project area) and intervening non-shoal areas, and to identify and count all terns seen. The purpose was to maximize encounters rather than to establish densities. For this report, Horseshoe Shoal is defined as the area bounded by survey lines between the navigational buoys G7 (NW), R2 (SW), R18 (SE) and G2 (NE). This area differs somewhat from the proposed turbine field.

METHODS

Six flights were made: 4 in early July (2, 4, 4, 15), and 2 in early September (8, 9), 2001. A range of tidal conditions was selected. The plane was a high-wing amphibian (Cessna 185), and a single observer counted birds through the side-window. Forward visibility was good and the pilot assisted with detecting birds. Flight directions were selected to optimize visibility. Plane height was about 200 ft. (60 m) and speed 90 knots (160 km/h), but were varied to facilitate counting and identification of terns encountered.

RESULTS

The study area comprised Horseshoe Shoal (HSS) and adjacent parts of Nantucket Sound from south of Woods

Hole to Bishop and Clerks Reef. Survey flights totaled 408 miles (656 km): 188 miles (302 km) in the 'near' zone, 86 miles (138 km) over HSS, and 134 miles (216 km) in the 'far' zone from which commuters would be likely to cross the turbine field.

During the survey flights, terns were seen in small numbers at low altitudes: the largest flock was about 60 birds, and all were well below 98 feet (30 m) asl (judged as midway from observer to the water surface). However, larger numbers were reported (by pilot Garry Small) as present on other days, e.g. "Hundreds" over Hedge Fence Shoal at about 1030 on 5 August, and at about 1130 on 5 September. Almost all the terns were foraging over the shallowest parts of the shoals. (For Horseshoe Shoal this refers to the western edge at the northwest corner). Foraging terns were also seen at the following shoals: Middle Ground, Hedge Fence, L'Hommedieu, Succonesset, Eldridge, and Wreck. Very small numbers were perched on buoys, or were in direct flight and thus apparently commuting.

Terns counted during the six flights totaled 247 Roseate, 62 Common and 2 Least. All but 11 of these were foraging over the shallowest shoal waters. Only 24 were over HSS, 282 were in the 'near' zone, and only 3 in the 'far' zone. Survey effort was unequal. Numbers of terns per km are summarized in Table 1 below.

The numbers of terns seen in Nantucket Sound, are summarized per km of flight path (excluding loops and detours). The data are tabulated to show (1) the numbers over Horseshoe Shoal (HSS), (2) Far = the numbers beyond HSS (and thus expected to commute over it), and (3) Near = the numbers before HSS. Categories (2) and (3), (Far and Near, respectively) refer to the principal movements of the birds at that season (the outer regions of the Sound are thus in opposite categories in the 2 sets of counts because the terns shift their principal location after nesting).

Table 1.
Terns sighted during aerial surveys in Nantucket Sound, expressed as the number of terns seen/total miles of airplane track and as the numerical value of that fraction.

	Near	HSS	Far
Breeding Season	282/153	24/52	0/63
	1.1	0.3	0
Post Breeding	0/35	0/34	3/71
	0	0	0.03

CONCLUSIONS

During periods of high food demand, when feeding their young before and after they can first fly, terns spend much time in or near their foraging areas so that numbers present in an area indicate its relative importance. The observations from the plane suggest that Horseshoe Shoal was used by few terns and was not an important foraging area in 2001, and confirm the 1991-2 observations that breeders from Bird Island forage at shoals west of HSS. Such use would not lead to these birds crossing the turbine field. Very few terns used these western shoals after the breeding season, when they might commute across HSS to the roost on South Beach.

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